1   Framework

Output:
$$Y_t = S_t + I_t + U_t \tag{1}$$

Investment:
$$I_t = \frac{\frac{Y_{t-1}-Y_{t-2}}{v}}{(\frac{Y_{t-1}-Y_{t-2}}{v})^4 + q} \tag{2}$$

Consumption:
$$C_t = (1-s)(Y_{t-1}) + s(Y_{t-2}) \tag{3}$$

Predicted Consumption:
$$U_t = C_{t-1} + \eta_{t-1}(C_{t-1} - C_{t-2}) \tag{4}$$

Adaptive Prediction Parameter:
$$\eta_{t-1} = \frac{C_{t-1} - C_{t-2}}{C_{t-3} - C_{t-4}} \tag{5}$$

Produced for Inventory:
$$S_t = kU_t - Q_{t-1} \tag{6}$$

Inventory Level:
$$Q_t = Q_{t-1} + S_t + (U_t - C_t) \tag{7}$$

2   Solving for Growth

Defining Growth:
$$Z_{t-1} = Y_t - Y_{t-1} \tag{8}$$

Consumption in Terms of Growth:
$$C_t - C_{t-1} = (1-s)Z_{t-2} + sZ_{t-3} \tag{9}$$

Investment in Terms of Growth:
$$I_t - I_{t-1} = \frac{\frac{Z_{t-2}}{v}}{\left(\frac{Z_{t-2}}{v}\right)^4 + q} - \frac{\frac{Z_{t-3}}{v}}{\left(\frac{Z_{t-3}}{v}\right)^4 + q} \tag{10}$$

Adaptive Parameter in Terms of Growth:
$$\eta_{t-1} = \frac{(1-s)Z_{t-3} + sZ_{t-4}}{(1-s)Z_{t-4} + sZ_{t-5}} \tag{11}$$

Predicted Consumption in Terms of Growth:
$$U_t - U_{t-1} = [(1-s)Z_{t-3} + sZ_{t-4}] + \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right] - \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right] \tag{12}$$

2.1   Solving for Inventory Production in terms of Growth

Inventory Level found by substituting S_t
$$Q_t = kU_t - Q_{t-1} + Q_{t-1} + U_t - C_t$$

$$Q_t = U_t(k+1) - C_t \tag{13}$$

Change in Inventory in Terms of Growth:
$$Q_t - Q_{t-1} = (k+1)(U_t - U_{t-1}) - (C_t - C_{t-1})$$

$$Q_t - Q_{t-1} = (k+1)\left[[(1-s)Z_{t-3} + sZ_{t-4}] + \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right] - \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right]\right] \quad (14)$$
$$-(1-s)Z_{t-2} + sZ_{t-3}$$

Change in Inventory Production in Terms of Growth:

$$S_t - S_{t-1} = k(U_t - U_{t-1}) - (Q_{t-1} - Q_{t-2})$$

$$S_t - S_{t-1} = k\left[[(1-s)Z_{t-3} + sZ_{t-4}] + \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right] - \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right]\right] -$$
$$[(k+1)\left[[(1-s)Z_{t-4} + sZ_{t-5}] + \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right] - \left[\frac{[(1-s)Z_{t-5} + sZ_{t-6}]^2}{(1-s)Z_{t-6} + sZ_{t-7}}\right]\right] \quad (15)$$
$$-(1-s)Z_{t-3} + sZ_{t-4}]$$

2.2 Growth as a 6th Order Difference Equation

$$Z_{t-1} = \frac{\frac{Z_{t-2}}{v}}{\left(\frac{Z_{t-2}}{v}\right)^4 + q} - \frac{\frac{Z_{t-3}}{v}}{\left(\frac{Z_{t-3}}{v}\right)^4 + q} +$$

$$[(1-s)Z_{t-3} + sZ_{t-4}] + \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right] - \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right] +$$
$$k\left[[(1-s)Z_{t-3} + sZ_{t-4}] + \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right] - \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right]\right] -$$
$$[(k+1)\left[[(1-s)Z_{t-4} + sZ_{t-5}] + \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right] - \left[\frac{[(1-s)Z_{t-5} + sZ_{t-6}]^2}{(1-s)Z_{t-6} + sZ_{t-7}}\right]\right]$$
$$-(1-s)Z_{t-3} - sZ_{t-4}] \quad (16)$$

$$Z_t = \frac{\frac{Z_{t-1}}{v}}{\left(\frac{Z_{t-1}}{v}\right)^4 + q} - \frac{\frac{Z_{t-2}}{v}}{\left(\frac{Z_{t-2}}{v}\right)^4 + q} +$$

$$[(1-s)Z_{t-2} + sZ_{t-3}] + \left[\frac{[(1-s)Z_{t-2} + sZ_{t-3}]^2}{(1-s)Z_{t-3} + sZ_{t-4}}\right] - \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right] +$$
$$k\left[[(1-s)Z_{t-2} + sZ_{t-3}] + \left[\frac{[(1-s)Z_{t-2} + sZ_{t-3}]^2}{(1-s)Z_{t-3} + sZ_{t-4}}\right] - \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right]\right] -$$
$$[(k+1)\left[[(1-s)Z_{t-3} + sZ_{t-4}] + \left[\frac{[(1-s)Z_{t-3} + sZ_{t-4}]^2}{(1-s)Z_{t-4} + sZ_{t-5}}\right] - \left[\frac{[(1-s)Z_{t-4} + sZ_{t-5}]^2}{(1-s)Z_{t-5} + sZ_{t-6}}\right]\right]$$
$$-(1-s)Z_{t-2} - sZ_{t-3}] \quad (17)$$